

# **Wireless WII nunchuk controller**

## **Theory of Operation**

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### **1. Dongle Side Radio**

The radio system is mainly composed of three parts: radio modem, frequency synthesizer and baseband microprocessor. The radio is interfaced with the WIIMote via a 6-pin connector. WIIMote sends a command to the radio every 8 milliseconds. The radio takes the data from WIIMote, packetize the data by adding preambles, frame information, and error checking bytes. The packetized frame is transmitted to the wireless nunchuk. When nunchuk replies, this radio receives the data, un-packetize it, and sends to WIIMote. The radio modem is a FSK modem running at 1Mbps with GFSK encoding to avoid frequency drifting. Frequency is controlled by a frequency synthesizer which adjusts a voltage-controlled RF oscillator dynamically for accurate frequency management. A total of 79 channels can be selected conversing the frequency range of 2.402 – 2.480GHz. The antenna is an embedded PCB antenna matching is done by using lumped inductors and capacitors. The radio is a half-duplex system and is powered by WIIMote. The total average power consumption of the radio system is about 20 mA at 3.3V.

### **2. Nunchuk Side Radio**

Nunchuk side radio operates in similar way to Dongle Side Radio as described in previous section. A total of 79 channels can be selected conversing the frequency range of 2.402 – 2.480GHz.. It scans keystrokes on the nunchuk. Similarly, the data is packetized in the same way as Dongle Side Radio. The controller radio is powered by 2-AA size batteries and step-up to 3.3V. The total average power consumption of the radio system is about 15 mA.